

Set	Items	Description
S1	13661	LAPLACE OR SIGNUM OR (FAST OR DIGITAL) () FOURIER() TRANSFORM? OR FFT OR DFT OR FOURIER() TRANSFORM?
S2	20006	(DIGITAL OR ELECTRONIC) (2W) (WATERMARK? OR WATER() MARK?) OR WATERMARK? OR WATER() MARK? OR TRANSLUCENT() DESIGN?
S3	8767594	FILTER? OR LOOKUP OR LOOK() UP OR SEARCH? OR SEEK? OR QUER? OR MATCH? OR QUEST? OR PURSU? OR FIND? OR RETRIEV? OR EXTRACT? OR SEPARATE? OR DIFFERENTIAT? OR SCREEN? OR PREFILTER? OR PR- E() FILTER?
S4	4866795	DETECT? OR DETERMIN? OR DECID? OR RESOLV? OR ASCERTAIN? OR RECOGNI?
S5	36	S1(S) S2
S6	11	S5 (S) S3
S7	0	S6 (S) S4
S8	36	S5 OR S6
S9	0	S8 NOT PY>1995

File 15:ABI/Inform(R) 1971-2004/Aug 12  
(c) 2004 ProQuest Info&Learning

File 810:Business Wire 1986-1999/Feb 28  
(c) 1999 Business Wire

File 647:cmp Computer Fulltext 1988-2004/Aug W1  
(c) 2004 CMP Media, LLC

File 275:Gale Group Computer DB(TM) 1983-2004/Aug 12  
(c) 2004 The Gale Group

File 674:Computer News Fulltext 1989-2004/Jul W4  
(c) 2004 IDG Communications

File 696:DIALOG Telecom. Newsletters 1995-2004/Aug 11  
(c) 2004 The Dialog Corp.

File 621:Gale Group New Prod.Annou.(R) 1985-2004/Aug 12  
(c) 2004 The Gale Group

File 636:Gale Group Newsletter DB(TM) 1987-2004/Aug 12  
(c) 2004 The Gale Group

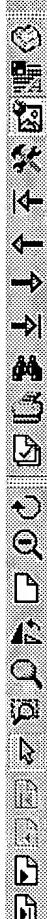
File 813:PR Newswire 1987-1999/Apr 30  
(c) 1999 PR Newswire Association Inc

File 613:PR Newswire 1999-2004/Aug 12  
(c) 2004 PR Newswire Association Inc

File 16:Gale Group PROMT(R) 1990-2004/Aug 12  
(c) 2004 The Gale Group

File 160:Gale Group PROMT(R) 1972-1989  
(c) 1999 The Gale Group

File 553:Wilson Bus. Abs. FullText 1982-2004/Jul  
(c) 2004 The HW Wilson Co



Courier New 10

US-PAT-NO: 5488664  
DOCUMENT-IDENTIFIER: US 5488664 A

TITLE: Method and apparatus for protecting visual information with printed cryptographic watermarks

----- KWIC -----

US Patent No. - PN (1): 5488664

#### Brief Summary Text - BSTX (10):

The purpose of the invention is to produce a printed watermark which provides reasonable security against unauthorized access to and modification of visual information at very low costs. The cryptographic printed watermark of the invention can be produced by standard laser or ink-jet printers and verified directly by the human visual system without using any crypto knowledge, computational devices or chemical processes. The watermark consists of an array of printed shapes which appears to be random, and the developer consists of another array of printed shapes, which also appears to be printed on a transparent medium. When the transparent developer is applied to the printed watermark, a hidden image becomes clearly visible.

#### Detailed Description Text - DETX (2):

With reference to the drawings which illustrate a typical watermark developer and various pixels and subpixels, FIG. 1a illustrates an array of subpixels forming a typical printed watermark and FIG. 1b illustrates an array of subpixels forming a typical printed developer. The hidden image is completely invisible in each of the two arrays. If FIG. 1b is photocopied onto a transparency 2 and then placed on top of and aligned with sheet 4 having a watermark printed thereon, FIG. 1a, as shown in FIG. 1c, a viewer looking through FIG. 1b of the transparency, illustrating the developer, onto the watermark, sees the hidden image of a circle 6, which is encoded in the apparently random array of shapes that makes up FIGS. 1a and 1b. The subpixels of the arrays of FIGS. 1a and 1b are rectangles each pair consisting of two black subpixels and two white subpixels.

#### Detailed Description Text - DETX (8):

Another embodiment of the invention allows images to be concealed, for example, a first sheet of material may be printed with an image of, for example, a house. A second transparent sheet of material may be printed with an image of, for example, a dog. The developer (transparency) image may be superimposed on the watermark image of the house and a hidden image may then be seen with no trace of either the house or the dog being visible. To construct such a scheme, a more complex collection of 2-times-2 subpixels is used, as shown in FIGS. 4a to 4l. In the individual line subarrays having two black subpixels are considered to be white and those having three black subpixels are considered to be black. In the superimage, subarrays having three black subpixels are considered to be white.

#### United States Patent (1)

(1) Patent Number: 5,488,664  
(2) Date of Patent: Jan. 30, 1996

(34) METHOD AND APPARATUS FOR PROTECTING VISUAL INFORMATION WITH PRINTED CRYPTOGRAPHIC WATERMARKS

943491 10/1983 United Kingdom

99976 01/56 United Kingdom

211283 10/1986 United Kingdom ... 300 1001

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(36) Assignee: Toda Research and Development Co., Ltd., Rehovot, Israel

(57) ABSTRACT

A method and device for protecting visual information against unauthorized access and modification using a printed watermark which is formed by printing a first array of shapes on a first sheet of material and then printing a second array of shapes on a second sheet of material, which is transparent so as to form a developer for developing a watermark encoded in a combination of the first and second arrays of shapes. The watermark is encoded by preparing each array using black and white pixels. Each pixel, which may be a square, rectangular, etc., hexagon or other shape, is split into first and second collections of pixels, the first collection of pixels appearing in the first array of shapes and the second collection of pixels appearing in the second array of shapes. When the transparent second sheet of material is positioned directly on top of the first sheet of material with the second array of shapes aligned with the first array of shapes, the first sheet of material may be viewed through the transparent second sheet of material. In this manner, the encoded watermark will not be visible in either one of the two individual sheets. Furthermore, addition of a third transparent sheet in the first sheet, a second sheet may be encoded in the second sheet, and the watermark may be viewed as a third image that is visible in the combination of the first and second sheets.

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PAT-NO: 6647130

UMENT-IDENTIFIER: US 6647130 B2

LE: Printable interfaces and digital linking with embedded codes

----- KWIC -----

## tract Text - ABTX (1):

A physical medium is encoded with machine readable information that provides a human interface to a computer system. The information encoded into the medium indicates a computer implemented process, and is encoded according to a particular encoding scheme, such as encoding by modifying color values of a graphic or other image printed on the medium. For example, a digital watermark or other steganographic data hidden in the image indicates a web page. In response to the user selecting the encoded information area, the machine readable information is decoded, and used to invoke a computer implemented process.

## ailed Description Text - DETX (271):

A major improvement to the nominal knot pattern system previously described addresses practical difficulties (1), the inefficient covering, unwanted visibility of the rings, and (6) the need for higher levels of security. This improvement also indirectly address item (4) the overlapping, which has been discussed in the last paragraph. This major improvement is as follows: just prior to the step where the mosaic of the encoded terms is added to an original image to produce a distributable image, a set of encoded knot patterns, 866, is spatially filtered (using common techniques) by a standardized and (generally smoothly) random phase-only filter. It is very important to note that this phase-only filter is itself fully rotationally symmetric within the spatial frequency domain, so filtering effects are fully rotationally symmetric. The effect of this phase-only filter on an individual luminous ring is to transform it into a slightly varying pattern of concentric rings, not totally dissimilar to a pattern on water several instances after a pebble is dropped in, only these patterns are somewhat random in the case of this phase-only filter in the uniform periodicity of a pebble wave pattern. FIG. 20 attempts to be a rough (i.e. non-greyscale) depiction of these phase-only filtered terms. The top figure of FIG. 20 is a cross section of a typical bridge tower/profile 874 of one of these phase-only filtered ring patterns. Reference in the figure is the nominal location of the pre-filtered outer, 870. The center of an individual ring, 872, is referenced as the point at which the brightness profile is rotated in order to fully describe the dimensional brightness distribution of one of these filtered patterns. A rough attempt to communicate the characteristics of the filtered terms depicted as 876, a crude greyscale image of the filtered ring. This phase-only filtered ring, 876 will can be referred to as a random ripple term.

(3) United States Patent  
Bhoads(cc) Patent No.: US 6,647,130 B2  
(45) Date of Patent: Nov. 11, 2003

## (34) PRINTABLE INTERFACES AND DIGITAL LINKING WITH EMBEDDED CODES

(56) Field of Search 362/100, 112, 362/132, 251; 348/3, 28, 448, 450, 345/54, 231-234, 287, 283-285, 73, 93, 94, 113, 502; 348/475.1; 232/454, 340/5, 53, 1, 6, 1, 63, 1, 8, 1, 81, 3, 83, 355/71; 902/1, 4, 6, 713, 716, 382/54, 705/2, 44, 345/760, 761, 764, 617, 636, 707/10, 704, 501, 513, 709/200, 217-219, 237, 236, 240, 252, 312, 323, 329

(75) Inventor: Geoffrey B. Bhoads, New Lim, OR (US)

(73) Assignee: Digimarc Corporation, Portland, OR (US)

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(22) Filed: Jul 3, 2001

(List continued on next page)

(65) Prior Publication Data

OTHER PUBLICATIONS

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U.S. patent application Ser. No. 08/700,442, filed, filed Jun. 1996.  
(List continued on next page)

## Related U.S. Application Data

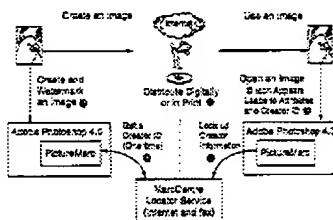
(33) Continuation of application No. 09/189,177, filed on Jul. 6, 2001, which is a continuation of application No. 08/746,515, filed on Nov. 12, 1996, now Pat. No. 5,582,423, which is a continuation of application No. 08/314,227, filed on May 18, 1993, now Pat. No. 5,582,424, and a continuation of application No. 08/108,083, filed on Jul. 27, 1992, now Pat. No. 5,582,425, which is a continuation-in-part of application No. 08/051,222, and a continuation-in-part of application No. 08/157,425, filed on Oct. 21, 1994, now Pat. No. 5,795,626, and a continuation of application No. 08/157,426, filed on Oct. 21, 1994, now abandoned and application No. 08/327,422, filed on Oct. 21, 1994, is a continuation-in-part of application No. 08/157,427, filed on Oct. 21, 1994, now abandoned, which is a continuation-in-part of application No. 08/157,428, filed on Nov. 18, 1994, now abandoned.

(51) Int. Cl.:

H04K 1/00

(35) U.S. Cl.

19 Claims, 51 Drawing Sheets



5768,426 572336

Courier New 10

DERWENT-ACC-NO: 2902-391428  
 DERWENT-WEEK: 200417  
 COPYRIGHT 1999 DERWENT INFORMATION LTD  
 TITLE: A method to embed and extract hidden digital watermark to protect the copyright of the original image by embedding the watermarked image to the original image through clockwise and counterclockwise DCT transformations  
 INVENTOR: SHIU, C; WU, J ; HSU, C  
 PATENT-ASSIGNEE: CYBERLINK CORP [CYBEN]  
 PRIORITY-DATA: 1999TW-0112076 (July 16, 1999)  
 PATENT-FAMILY:  

PUB-NO	PUB-DATE	LANGUAGE	P
US 6700991 B1	March 2, 2004	N/A	00
TW 451171 A	August 21, 2001	N/A	00

  
 APPLICATION-DATA:  

PUB-NO	APPL-DESCRIPTOR	APPL-NO
US 6700991B1	N/A	2000US-0520058
TW 451171A	N/A	1999TW-0112076

  
 INT-CL (IPC): G06K009/00, G06K009/46, G09C005/00  
 ABSTRACTED-PUB-NO: TW 451171A  
 BASIC-ABSTRACT:  

NOVELTY - This invention discloses a method to embed hidden digital watermark to protect the copyright of the original image. The method includes the following: an original image and a watermark image are provided. A scattered watermarked image is produced by randomly scattering the watermark image in the original image. Then, the original image and the scattered watermark image are sorted on the base of section to generate multiple original sections and the watermarked sections corresponding to the original sections through a determined sorting approach. The original image sections are DCT transformed clockwise to convert the sections to DCT coefficient sections corresponding to different frequency ranges. The watermark sections are embedded to the DCT coefficient sections of the original image sections within the determined frequency range to generate multiple combined DCT coefficient sections. Then, the combined DCT coefficient sections are DCT transformed counterclockwise to produce an image with embedded watermark to protect the copyright of the original image.

  
 CHOSEN-DRAWING: Dwg.1/1  
 TITLE-TERMS: METHOD EMBED EXTRACT HIDE DIGITAL WATERMARK PROTECT ORIGINAL IMAGE EMBED WATERMARK IMAGE ORIGINAL IMAGE THROUGH CLOCKWISE DCT TRANSFORM

Details Text Image HTML Full

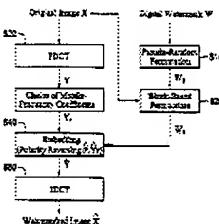
(a) United States Patent  
 Wu et al.

(c) Patent No.: US 6,700,991 B1  
 (d) Date of Patent: Mar. 2, 2004

- (e) HIDDEN DIGITAL WATERMARKS IN IMAGES  
 (f) Inventor: Je-Ling Wu, Taipei (TW); Chiu-Ting Hsu, Taipei (TW)  
 (g) Assignee: Cyberlink Corporation, Taipei (TW)  
 (\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.  
 (h) Appl. No.: 09/200,058  
 (i) Filed: Mar. 7, 2000  
 (j) Foreign Application Priority Data  
 (k) Int. Cl.: G06K 9/00, G06K 9/46  
 (l) U.S. Cl.: 382/106, 352/250  
 (m) Field of Search: 382/100, 350  
 (n) References Cited  
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 Primary Examiner—Leo Bondocan  
 Assistant Examiner—Hossein Alavizadeh  
 (t) Attorney, Agent or Firm—Fish & Richardson P.C.  
 (u) ABSTRACT  
 An image watermarking method by embedding digital watermark to protect the copyright providing an original image and a watermark image, applying pre-defined discrete cosine transform (DCT) to the original image to generate a dispersed watermark image; applying block-based permutations in the original image and the dispersed watermark image in order to form a plurality of original image blocks with each of the watermark blocks disposed over the corresponding image blocks; applying FDCT (Forward Discrete Cosine Transform) to each of the original image blocks independently so that each of the watermark blocks is transformed into a DCT coefficient block that corresponds to different frequency ranges; embedding said watermark image blocks into said DCT coefficient blocks, to form the embedded DCT coefficient blocks in form of embedded watermark image.

10 Claims, 9 Drawing Sheets



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Courier New 10

US-PAT-NO: 606955  
 DOCUMENT-IDENTIFIER: US 606955 A  
 TITLE: System for protection of goods against counterfeiting

----- KWIC -----

## Abstract Text - ABSTRACT (1):

A visible seal or label containing a serial number is placed in plain view on the product packaging. The visible label contains the serial number as a first public key encrypted version of the serial number. A second hidden label inside of the package has thereon a second or second encrypted version of the serial number made using a second public key. The hide label may be secured inside of the package out of sight or may be placed on the visible label and therefore viewable through a transparent case opened or visible when peeled off. The private keys are known only to the manufacturer. Using a corresponding public key provided by the manufacturer, the consumer, law enforcement agent, or customs inspector can verify that the second encrypted version matches the serial number. An advantage to this method is that only the manufacturer can produce matching pairs. Moreover, us of sale machine equipped with the public key the sales clerk can authenticate the product in front of the consumer at point of purchase. Additionally, in the case of a CD or other digital medium, the hidden label may comprise a digital watermark of the encrypted serial number such that a consumer, law enforcement agency, or customs inspector can readily detect a counterfeit product.

US Patent No. - PN (1):

606955

## United States Patent [12]

Coppersmith et al.

[11] Patent Number: 6,069,555  
 [15] Date of Patent: May 30, 2000

## [54] SYSTEM FOR PROTECTION OF GOODS AGAINST COUNTERFEITING

[75] Inventor: Ben Coppersmith, Hastings, Claude A., Greenwood, Chicago; Charles R. Turner, Milwaukee, and Bill W., Owings, all of N.Y.

[73] Assignee: International Business Machines Corporation, Armonk, N.Y.

[21] Appl. No.: 09/060,036

[22] Filed: Apr. 14, 1998

[51] Int. CL.: G06C 5/04; H04N 1/00  
[52] U.S. CL.: 360/14; 360/10; 360/20; 360/25; 360/26; 360/27; 713/275

[56] Field of Search: 360/24; 360/25; 360/26; 360/27; 713/275

[56] References Cited:  
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JP06028A 2/26/96 United Kingdom; JP07 2725745A 2/26/95 United Kingdom; H04N 1/04

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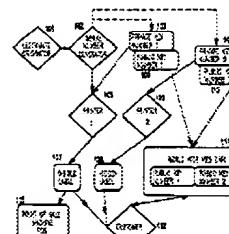
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Primary Examiner—Joseph P. Tranczek  
 Assistant Examiner—Grace H. Nguyen  
 Attorney, Agent, or Firm—Whitman, Curtis & Whitman  
 Stephen C. Kaufman, Esq.

## [57] ABSTRACT

A visible seal or label containing a serial number is placed in plain view on the product packaging. The visible label contains the serial number as well as a first public key encrypted version of the serial number. A second or hidden label inside of the package has thereon a second or second encrypted version of the serial number made using a second public key. The private keys are known only to the manufacturer. Using a corresponding public key provided by the manufacturer, the consumer, law enforcement agent, or customs inspector can verify that the second encrypted version matches the serial number. An advantage to this method is that only the manufacturer can produce matching pairs. Moreover, us of sale machine equipped with the public key the sales clerk can authenticate the product in front of the consumer at point of purchase. Additionally, in the case of a CD or other digital medium, the hidden label may comprise a digital watermark of the encrypted serial number such that a consumer, law enforcement agency, or customs inspector can readily detect a counterfeit product.

17 Claims, 3 Drawing Sheets



INVENTION REPORTS	SEARCH
SEARCH REPORTS	PLACE OF PURCHASE
SEARCH REPORTS	DECODE
SEARCH REPORTS	REPORT
SEARCH REPORTS	REPORT

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Details Text Image HTML Full

L Number	Hits	Search Text	DB	Time stamp
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2	11	("5208857"   "5323187"   "5809139"   "5864649"   "5930369"   "6185312"   "6240121"   "6285775"   "6317767"   "6373974"   "6560370").PN.	USPAT	2004/08/19 20:59
3	3	6069955.URPN.	USPAT	2004/08/19 21:04
4	78	5488664.URPN.	USPAT	2004/08/19 21:20
5	45	5734752.URPN.	USPAT	2004/08/19 21:17
6	1	("5488664").PN.	USPAT	2004/08/19 21:20